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August 20, 1993

Mr. William Caton
Acting Secretary
Federal Communications Commission
1919 M Street, NW
Washington, D.C. 20554

RE: Ex Parte Filing
Personal Communications Services
GEN Docket No. 90-314;
Emerging Technologies
ET Docket No. 92-9

Dear Mr. Caton:

Enclosed are an original and one copy of a document addressing the bandwidth requirements for new personal communications services. On this date, I provided a copy of the enclosed document to Jerry Vaughn during a meeting in which we discussed the subject of the enclosure. Please associate the material with the above-captioned dockets.

Sincerely,

Alex D. Felker

Enclosure

No. of Copies rec'd 0+1
List A B C D E

PCS Assignment Bandwidth of at Least 40 MHz Is Required To:

- Support Vocoder and Data Rates Competitive with Existing Wire/Wireless Nets
- Facilitate Prompt Service Availability via Band Sharing with Incumbents
- Lower Subscriber Costs
  - Increases trunking efficiency
  - Decreases investment in frequency reuse
- **Establish Coverage/Capacity Parity Between 2 GHz PCS and 800 MHz Cellular**

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30 MHz Does Not Facilitate PCS/Microwave Co-Existence

- **Microwave channels are generally 10 MHz**
  - Receiver passbands frequently wider than 10 MHz
  - Adjacent channels generally vacant
- **40 MHz pairing (20 X 20 MHz) allows access to some spectrum immediately**
- **30 MHz pairing (15 X 15 MHz) can result in:**
  - Competitors jointly negotiating with microwave licensee
  - Inability to use any portion of assignment in certain congested areas

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DIFFERENCES IN PHYSICAL PROPERTIES OF 800 MHZ AND 2 GHZ

- Higher frequency signals propagate more poorly in free space
  - Results in 8 - 10 dB greater transmission loss at 2 GHz
- Greater fading at 2 GHz
  - For equivalent coverages, implies greater average received power
- Lower handset power
  - Cellular: 600 mW; PCS: probably < 300 mW

If the effects of these properties are not offset, 2 GHz PCS systems will require at least 4 times as many cell sites as 800 MHz cellular systems for comparable levels of coverage & capacity

CELLULAR/PCS PARITY

TO PUT PCS COVERAGE & CAPACITY ON PAR WITH CELLULAR REQUIRES:

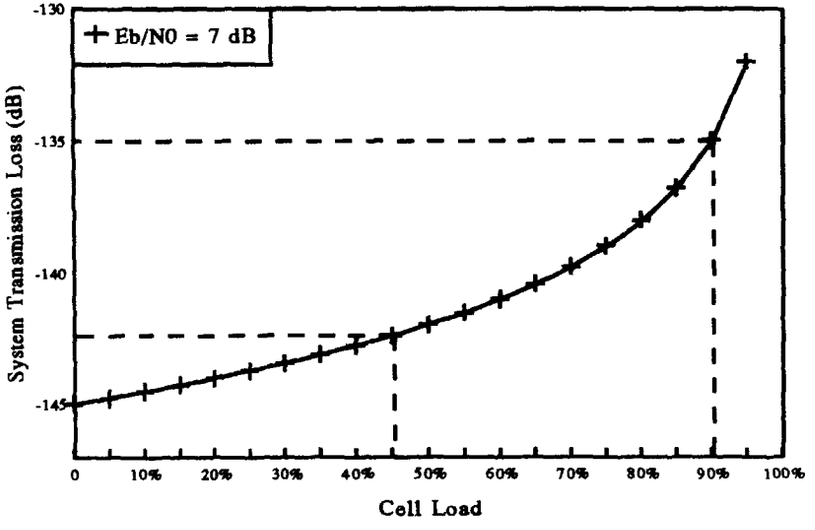
- Equivalent numbers of base stations and comparable power levels
- Sufficient spectrum to make PCS traffic handling capacity comparable to cellular

Q-CDMA PERMITS COVERAGE/CAPACITY TRADEOFF

For a given radiated power level:

- Coverage may be increased by reducing number of active voice channels
- Number of voice channels may be increased by reducing coverage

Q-CDMA SYSTEM TRANSMISSION LOSS IS A FUNCTION OF LOADING



To obtain coverage and capacity parity with cellular's 25 MHz, PCS must have at least 40 MHz of **CLEAR** spectrum

$$T(r) = CNR_{min} + (N_0W)_c - p_t - 10\log(1-X)$$

Where,
X = Loading Factor

Source: The CDMA Network Engineering Handbook
Vol. I, Qualcomm, Inc; November 23, 1992

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A Single 40 MHz Assignment is More Efficient Than One Created by Aggregating 20 MHz Assignments

- **Single 40 MHz Assignments:**
  - Minimize transaction costs
    - Estimated at $1 Billion in cellular
    - Greater attention placed on cutting deals than on rolling out service
  - Maximize auction revenues
  - Provide for smaller assignments, if appropriate
    - Through partial assignments
    - Competition will promote smaller bandwidths when they are more efficient
- **Basing assignment size on large market requirements:**
  - Recognizes need for "critical mass" of subscribers
  - Does not disadvantage smaller areas
    - Regions with lighter traffic generally have excess cellular capacity and will not support multiple PCS operators